



81289-284779-modified.ST25.txt
SEQUENCE LISTING

<110> Hovanec, Timothy A
<120> Ammonia-Oxidizing Bacteria
<130> 81289-284779
<140> 10/659,983
<141> 2003-09-10
<150> US 09/573,684
<151> 2000-05-19
<150> US 60/386,217
<151> 2002-09-19
<150> US 60/386,218
<151> 2002-09-19
<150> US 60/386,219
<151> 2002-09-19
<160> 23
<170> PatentIn version 3.2
<210> 1
<211> 1457
<212> DNA
<213> Unknown
<220>
<223> AOB Type A R7clone140 16S rDNA

<400> 1
attgaacgct ggcggcatgc ttacacatg caagtcgaac ggcagcacgg atgcttgcac 60
ctggtggcga gtggcgagc ggtgagtaat gcacgcgaac gtatccagaa gaggggggta 120
acgcacgaa agatgtgcta ataccgata tactctaagg aggaaagcag gggatcgaaa 180
gaccttgcgc ttttggagcg gccgatgtct gattagctag ttggtggggg aaaggcctac 240
caaggcgacg atcagtagtt ggtctgagag gacgaccagc cacactggga ctgagacacg 300
gcccagactc ctacgggagg cagcagtggg gaattttgga caatgggcgc aagcctgac 360
cagcaatgcc gcgtgagtga agaaggcctt cgggttgtaa agctctttca gtcgagaaga 420
aaagggttacg gtaaataatc gtgactcatg acggtatcga cagaagaagc accggctaac 480
tacgtgccag cagccgcggt aatacgtagg gtgcaagcgt taatcggaat tactgggcgt 540
aaagggtgcg caggcggtt tgtaagtcag atgtgaaatc cccgggctta acctgggaat 600
tgcgtttgaa actacaaggc tagagtgtgg cagagggagg tggaattcca tgtgtagcag 660
tgaaatgcgt agagatatgg aagaacatcg atggcgaagg cagcctcctg ggttaacact 720
gacgtcatg cacgaaagcg tggggagcaa acaggattag ataccctggg agtccacgcc 780
ctaaacgatg tcaactagtt gttgggcctt attaggcttg gtaacgaagc taacgcgtga 840

81289-284779-modified.ST25.txt

| | | | | | | |
|-------------|-------------|------------|-------------|-------------|-------------|------|
| agttgaccgc | ctggggagta | cggtcgcaag | attaaaaactc | aaaggaattg | acggggaccc | 900 |
| gcacaagcgg | tggattatgt | ggattaattc | gatgcaacgc | gaaaaacctt | acctaccctt | 960 |
| gacatgtagc | gaatttttcta | gagatagatt | agtgccttcgg | gaacgctaac | acaggtgctg | 1020 |
| catggctgtc | gtcagctcgt | gtcgtgagat | gttgggttaa | gtcccgcac | gagcgcaacc | 1080 |
| cttgtcatta | attgccatca | tttggttggg | cactttaatg | agactgccgg | tgacaaaccg | 1140 |
| gaggaagggtg | gggatgacgt | caagtcctca | tggcccttat | gggtagggct | tcacacgtaa | 1200 |
| tacaatggcg | cgtacagagg | gttgccaacc | cgcgaggggg | agctaattctc | agaaagcgcg | 1260 |
| tcgtagtccg | gatcggagtc | tgcaactcga | ctccgtgaag | tcggaatcgc | tagtaatcgc | 1320 |
| ggatcagcat | gtcgcggtga | atacgttccc | gggtcttgta | cacaccgccc | gtcacaccat | 1380 |
| gggagtgggt | ttcaccagaa | gcaggtagtc | taaccgtaag | gagggcgctt | gccacgggtga | 1440 |
| gattcatgac | tgggggtg | | | | | 1457 |

<210> 2
 <211> 1457
 <212> DNA
 <213> Unknown

<220>
 <223> AOB Type A1 R7clone187 16S rDNA

| | | | | | | |
|------------|------------|------------|-------------|------------|------------|-----|
| <400> 2 | | | | | | |
| attgaacgct | ggcggcatgc | tttacacatg | caagtcgaac | ggcagcacgg | atgcttgcac | 60 |
| ctggtggcga | gtggcggacg | ggtgagtaat | gcatcggaac | gtatccagaa | gaggggggta | 120 |
| acgcatcgaa | agatgtgcta | ataccgcata | tactctaagg | aggaaagcag | gggatcgaaa | 180 |
| gaccttgccg | ttttggagcg | gccgatgtct | gattagctag | ttggtggggg | aaaggcctac | 240 |
| caaggcgacg | atcagtagtt | ggtctgagag | gacgaccagc | cacactggga | ctgagacacg | 300 |
| gcccagactc | ctacgggagg | cagcagtggg | gaatttttga | caatgggcgc | aagcctgac | 360 |
| cagcaatgcc | gcgtgagtga | agaaggcctt | cgggttgtaa | agctctttca | gtcgagaaga | 420 |
| aaaggttacg | gtaaataatc | gtgacccatg | acggtatcga | cagaagaagc | accggctaac | 480 |
| tacgtgccag | cagccgcggt | aatacgtagg | gtgcaagcgt | taatcggaat | tactgggcgt | 540 |
| aaagggtgcg | caggcggcct | tgtaagtcag | atgtgaaatc | cccgggctta | acctgggaat | 600 |
| tgcgtttgaa | actacaaagc | tagagtgtgg | cagagggagg | tggaattcca | tgtgtagcag | 660 |
| tgaaatgcgt | agagatatgg | aagaacatcg | atggcgaagg | cagcctcctg | ggttaacact | 720 |
| gacgctcatg | cacgaaagcg | tggggagcaa | acaggattag | ataccctggg | agtccacgcc | 780 |
| ctaaacgatg | tcaactagtt | gttgggcctt | attaggcttg | gtaacgaagc | taacgcgtga | 840 |
| agttgaccgc | ctggggagta | cggtcgcaag | attaaaaactc | aaaggaattg | acggggaccc | 900 |

81289-284779-modified.ST25.txt

gcacaagcgg tggattatgt ggattaattc gatgcaacgc gaaaaacctt acctaccctt 960
gacatgtagc gaattttcta gagatagatt agtgcttcgg gaacgctaac acagggtgctg 1020
catggctgtc gtcagctcgt gtcgtgagat gttgggttaa gtcccgaac gagcgcaacc 1080
cttgtcatta attgccatca tttggttggg cactttaatg agactgccgg tgacaaaccg 1140
gaggaagggtg gggatgacgt caagtcctca tggcccttat gggtagggct tcacacgtaa 1200
tacaatggcg cgtacagagg gttgccaacc cgcgaggggg agctaatttc agaaagcgcg 1260
tcgtagtccg gatcggagtc tgcaactcga ctccgtgaag tcggaatcgc tagtaatcgc 1320
ggatcagcat gtcgcgggtga atacgttccc gggctttgta cacaccgcc gtcacaccat 1380
gggagtgggt ttcaccagaa gcaggtagtc taaccgtaag gagggcgctt gccacgggtga 1440
gattcatgac tgggggtg 1457

<210> 3
<211> 1458
<212> DNA
<213> Unknown

<220>
<223> AOB Type B R3clone5 16S rDNA

<400> 3
attgaacgct ggcggcatgc ttacacatg caagtcgaac ggcagcacgg gggcaaccct 60
ggtaggcgagt ggcgaacggg tgagtaatac atcggaaagt atcttcgagg gggggataac 120
gcaccgaaag gtgtgctaata accgcataat ctccacggag aaaagcaggg gatcgcaaga 180
ccttgcgctc ttggagcggc cgatgtctga ttagctagtt ggtgaggtaa tggcttacca 240
aggcgacgat cagtagctgg tctgagagga cgaccagcca cactgggact gagacacggc 300
ccagactcct acgggaggca gcagtgggga attttggaca atgggggaaa ccctgatcca 360
gccatgccgc gtgagtgaag aaggccttcg ggttgtaaag ctctttcagc cggaacgaaa 420
cggtcacggc taatacccgt gactactgac ggtaccggaa gaagaagcac cggctaacta 480
cgtgccagca gccgcggtaa tacgtagggt gcaagcgta atcggaaatta ctgggcgtaa 540
agcgtgcgca ggcggttttg taagtcagat gtgaaagccc cgggcttaac ctgggaactg 600
cgtttgaaac tacaaggcta gagtgtggca gaggggggtg gaattccacg tgtagcagtg 660
aaatgcgtag agatgtggag gaacaccgat ggcgaaggca gccccctggg ttaacaccga 720
cgctcaggca cgaaagcgtg gggagcaaac aggattagat accctggtag tccacgccct 780
aaacgatgtc aactagtgtg cgggtcttaa cggacttggt aacgcagcta acgcgtgaag 840
ttggccgcct ggggagtacg gtcgcaagat taaaactcaa aggaattgac ggggacccgc 900
acaagcgggtg gattatgtgg attaatcga tgcaacgcga aaaaccttac ctacccttga 960
catgtaccga agcccgccga gaggtgggtg tgcccgaaag ggagcggtaa cacagggtgct 1020

81289-284779-modified.ST25.txt

| | |
|---|------|
| gcatggctgt cgtcagctcg tgctgtgaga tgttgggtta agtcccgcaa cgagcgcaac | 1080 |
| ccttgtcatt aattgccatc attcagttgg gcactttaat gaaactgccg gtgacaaacc | 1140 |
| ggaggaaggt ggggatgacg tcaagtcctc atggccctta tgggtagggc ttcacacgta | 1200 |
| atacaatggc gcgtacagag ggttgccaac ccgcgagggg gagctaattc cagaaagcgc | 1260 |
| gtcgtagtcc ggatcgaggt ctgcaactcg actccgtgaa gtcggaatcg ctagtaatcg | 1320 |
| cggatcagca tgtcgcggtg aatacgttcc cgggtcttgt acacaccgcc cgtcacacca | 1380 |
| tgggagtggg tttcaccaga agcaggtagt ctaaccgcaa ggagggcgct tgccacggtg | 1440 |
| agattcatga ctgggggtg | 1458 |

<210> 4
 <211> 1460
 <212> DNA
 <213> Unknown

<220>
 <223> AOB Type C R5clone47 16D rDNA

| | |
|---|------|
| <400> 4 | |
| attgaacgct ggcggcatgc ttacacatg caagtcgaac ggcagcgggg gcttcggcct | 60 |
| gccggcgagt ggcgaacggg tgagtaatac atcggaacgt gtccttaagt ggggaataac | 120 |
| gcatcgaaag atgtgctaata accgcataatc tctgaggaga aaagcagggg atcgcaagac | 180 |
| cttgcgctaa aggagcggcc gatgtctgat tagctagttg gtggggtaaa ggcttaccaa | 240 |
| ggcaacgatc agtagttggt ctgagaggac gaccaaccac actgggactg agacacggcc | 300 |
| cagactccta cgggaggcag cagtggggaa ttttgacaa tgggcgaaag cctgatccag | 360 |
| ccatgccgcg tgagtgaaga aggccttcgg gttgtagagc tcttttagtc agaaagaaag | 420 |
| aatcatgatg aataattatg atttatgacg gtactgacag aaaaagcacc ggctaactac | 480 |
| gtgccagcag ccgcggtaat acgtagggtg cgagcgtaa tcggaattac tgggcgtaaa | 540 |
| gggtgcgtag gcggttttgt aagtcagatg tgaaagcccc gggcttaacc tgggaattgc | 600 |
| gtttgaaact acaaggctag agtgcagcag aggggagtgg aattccatgt gtagcagtga | 660 |
| aatgcgtaga gatgtggaag aacaccgatg gcgaaggcag ctccctgggt tgacactgac | 720 |
| gctcatgcac gaaagcgtgg ggagcaaaca ggattagata ccctggtagt ccacgcccta | 780 |
| aacgatgtca actggttgtc ggatctaatt aaggatttgg taacgtagct aacgcgtgaa | 840 |
| gttgaccgcc tggggagtac ggtcgcaaga ttaaaactca aaggaattga cggggacccg | 900 |
| cacaagcggg ggattatgtg gattaattcg atgcaacgcg aaaaacctta cctacccttg | 960 |
| acatgcttgg aatctagtgg agacataaga gtgcccgaag gggagccaag acacaggtgc | 1020 |
| tgcatggctg tcgtcagctc gtgtcgtgag atgttgggtt aagtcccgcg acgagcgcaa | 1080 |

81289-284779-modified.ST25.txt

cccttggtcac taattgctat cattctaaat gagcacttta gtgagactgc cgggtgacaaa 1140
 ccggaggaag gtgggggatga cgtcaagtcc tcatggccct tatgggtagg gcttcacacg 1200
 taatacaatg gcgtgtacag aggggttgcca acccgcgagg gggagccaat ctcagaaagc 1260
 acgtcgtagt ccggatcgga gtctgcaact cgactccgtg aagtcggaat cgctagtaat 1320
 cgcggtatcag catgccgcgg tgaatacgtt cccgggtctt gtacacaccg cccgtcacac 1380
 catggggagtg gttttcacca gaagcaggta gtttaaccgt aaggaggacg cttgccacgg 1440
 tgggggtcat gactggggtg 1460

<210> 5
 <211> 18
 <212> DNA
 <213> Artificial

<220>
 <223> oligonucleotide Probe

<400> 5
 cccccctctt ctggatac 18

<210> 6
 <211> 18
 <212> DNA
 <213> Artificial

<220>
 <223> PCR Primer

<400> 6
 cggaacgtat ccagaaga 18

<210> 7
 <211> 18
 <212> DNA
 <213> Artificial

<220>
 <223> PCR Primer

<400> 7
 atctctagaa aattcgct 18

<210> 8
 <211> 19
 <212> DNA
 <213> Artificial

<220>
 <223> oligonucleotide Probe

<400> 8
 tccccactc gaagatacg 19

<210> 9
 <211> 17
 <212> DNA
 <213> Artificial

<220>
 <223> PCR Primer

<400> 9
 atcggaacgt atcttcg

17

<210> 10
 <211> 16
 <212> DNA
 <213> Artificial

<220>
 <223> PCR Primer

<400> 10
 ccacctctcr gcgggc

16

<210> 11
 <211> 19
 <212> DNA
 <213> Artificial

<220>
 <223> PCR Primer

<400> 11
 tcagaaagaa agaatcatg

19

<210> 12
 <211> 19
 <212> DNA
 <213> Artificial

<220>
 <223> PCR Primer

<400> 12
 gtctccayta gattccaag

19

<210> 13
 <211> 17
 <212> DNA
 <213> Artificial

<220>
 <223> PCR Primer

<400> 13
 gtttgatcct ggctcag

17

<210> 14
 <211> 19
 <212> DNA

<213> Artificial

<220>

<223> PCR Primer

<400> 14

ggttaccttg ttacgactt

19

<210> 15

<211> 17

<212> DNA

<213> Artificial

<220>

<223> PCR Primer

<400> 15

cctacgggag gcagcag

17

<210> 16

<211> 18

<212> DNA

<213> Artificial

<220>

<223> PCR Primer

<400> 16

gwattaccgc ggckgctg

18

<210> 17

<211> 20

<212> DNA

<213> Artificial

<220>

<223> PCR Primer

<400> 17

cactctagcy ttgtagtttc

20

<210> 18

<211> 1467

<212> DNA

<213> Unknown

<220>

<223> N. Aestuarii-like AOB P4clone42 16S rDNA

<400> 18

ttgatcatgg ctcagattga acgctggcgg catgctttac acatgcaagt cgaacggcag 60

cacgggtgct tgcacctggt ggcgagtggc ggacgggtga gtaatgcatc ggaacgtgtc 120

cagaagtggg ggataacgca tcgaaagatg tgctaatacc gcatattctc tacggaggaa 180

agcaggggat cgaaagacct tgtgcttttg gagcggccga tgcctgatta gctagttggt 240

ggggtaaagg cctaccaagg caacgatcag tagttggtct gagaggacga ccagccacac 300

81289-284779-modified.ST25.txt

| | |
|---|------|
| tgggactgag acacggccca gactcctacg ggaggcagca gtggggaatt ttggacaatg | 360 |
| ggcgaaagcc tgatccagca atgccgcgtg agtgaagaag gcttcgggtt gtaaagctct | 420 |
| ttcagtcgag aagaaaaggt tgtgactaat aatcacaact tatgatggta ccgacagaag | 480 |
| aagcaccggc taactacgtg ccagcagccg cggtaatatg tagggtgcaa gcgttaatcg | 540 |
| gaattactgg gcgtaaaggg tgcgcaggcg gctttgtaag tcagatgtga aatccccggg | 600 |
| cttaacctgg gaattgcgtt tgaaactaca aagctagagt gtagcagagg ggggtggaat | 660 |
| tccatgtgta gcagtgaat gcgtagagat atggaagaac atcgatggcg aaggcagccc | 720 |
| cctgggttaa cactgacgct catgcacgaa agcgtgggga gcaaacagga ttagataccc | 780 |
| tggtagtcca cgccctaaac gatgtcaact agttgttggg ccttactagg cttggtaacg | 840 |
| tagctaacgc gtgaagttga ccgcctgggg agtacggctg caggattaaa actcaaagga | 900 |
| attgacgggg acccgacaaa gcggtggatt atgtggatta attcgatgca acgcgaaaaa | 960 |
| ccttacctac ccttgacatg tagcgaatat tttagagata aaatagtgcc ttcgggaacg | 1020 |
| ctaacacagg tgctgcatgg ctgtcgtcag ctcgtgtcgt gagatgttg gttaagtccc | 1080 |
| gcaacgagcg caacccttgt cattaattgc catcatttag ttgggcactt taatgagact | 1140 |
| gccggtgaca aaccggagga aggtggggat gacgtcaagt cctcatggcc cttatgggta | 1200 |
| gggcttcaca cgtaatacaa tggcgcgtac agagggttgc caaccgcga gggggagcta | 1260 |
| atctcagaaa gcgcgtcgta gtccggatcg gagtctgcaa ctcgactccg tgaagtcgga | 1320 |
| atcgctagta atcgcgatc agcatgtcgc ggtgaatacg tttccgggtc ttgtacacac | 1380 |
| cgcccgctac accatgggag tgggtttcac cagaagcaga tagtctaacc gtaagagggc | 1440 |
| gtttgccacg gcgagattca tgactgg | 1467 |

<210> 19
 <211> 1494
 <212> DNA
 <213> Unknown

<220>
 <223> N. Aestuarii-like AOB P4clone31 16S rDNA

| | |
|--|-----|
| <400> 19 | |
| agtttgatca tggctcagat tgaacgctgg cggcattgctt tacacatgca agtcgaacgg | 60 |
| cagcacgggt gcttgacact ggtggcgagt ggcggacggg tgagtaatgc atcggaacgt | 120 |
| gtccggaagt gggggataac gcatcgaaag atgtgctaatt accgcatatt ctctacggag | 180 |
| gaaagcaggg gatcgaaaga ctttgtgctt ttggagcggc cgatgcctga ttagctagtt | 240 |
| ggtggggtaa aggcctacca aggcaacgat cagtagttgg tctgagagga cgaccagcca | 300 |
| cactgggact gagacacggc ccagactcct acgggaggca gcagtgggga attttggaca | 360 |

81289-284779-modified.ST25.txt

acgggcgaaa gcctgatcca gcaatgccgc gtgagtgaag aaggccttcg ggttgtaaag 420
 ctcttttcagt cgagaagaaa aggttgtgac taataatcac aacttatgac ggtaccgaca 480
 gaagaagcac cggctaacta cgtgccagca gccgcggtaa tacgtagggg gcaagcggtta 540
 atcggaaatta ctgggcgtaa aggggtgcgca ggcggtcttg taagtcagat gtgaaatccc 600
 cgggcttaac ctgggaattg cgtttgaaac tacaaagcta gagtgtagca gaggggggtg 660
 gaattccatg tgtagcagtg aaatgcgtag agatatggaa gaacatcgat ggcgaaggca 720
 gccccctggg ttaacactga cgctcatgca cgaaagcgtg gggagcaaac aggattagat 780
 accctggtag tccacgccct aaacgatgtc aactagttgt tgggccttac taggcttggt 840
 aacgtagcta acgcgtgaag ttgaccgcct ggggagtacg gtcgcaagat taaaactcaa 900
 aggaattgac ggggacccgc acaagcgggtg gattatgtgg attaattcga tgcaacgcga 960
 aaaaccttac ctacccttga catgtagcga atattttaga gataaaatag tgccttcggg 1020
 aacgctaaca caggtgctgc atggctgtcg tcagctcgtg tcgtgagatg ttgggttaag 1080
 tcccgcaacg agcgcaaccc ttgtcattaa ttgccatcat ttagttgggc actttaatga 1140
 gactgccggt gacaaaccgg aggaaggtgg ggatgacgtc aagtcctcat ggcccttatg 1200
 ggtagggctt cacacgtaat acaatggcgc gtacagaggg ttgccaaccc gcgaggggga 1260
 gctaattctca gaaagcgcgt cgtagtccgg atcggagtta gcaactcgac tccgtgaagt 1320
 cggaatcgct agtaatcgcg gatcagcatg tcgcggtgaa tacgttcccc ggccctgtac 1380
 acaccgcccg tcacaccatg gaagttggct gcaccagaag taggttgtct aaccctcggg 1440
 aggacgctta ccacggtgtg gtcaatgact tgggggtgaag tcgtaacaag gtaa 1494

<210> 20
 <211> 1491
 <212> DNA
 <213> Unknown

<220>
 <223> N. Aestuarii-like AOB BF16clone57 16S rDNA

<400> 20
 gtttgatcat ggctcagatt gaacgctggc ggcatgcttt acacatgcaa gtcgaacggc 60
 agcacgggtg cttgcacctg gtggcgagtg gcggacgggt gagtaatgca tcggaacgtg 120
 tccagaagtg ggggataacg catcgaaaga tgtgctaata ccgcatattc tctacggagg 180
 aaagcagggg atcgaaagac cttgtgcttt tggagcggcc gatgcctgat tagctagttg 240
 gtggggtaaa ggcctaccaa ggcaacgatc agtagttggt ctgagaggac gaccagccac 300
 actgggactg agacacggcc cagactccta cgggaggcag cagtggggaa ttttggacaa 360
 tgggcgaaaag cctgatccag caatgccgcg tgagtgaaga aggccttcg gttgtaaagc 420
 tctttcagtc gagaagaaaa ggttgtgact aataatcaca acttatgacg gtaccgacag 480

81289-284779-modified.ST25.txt

| | | | | | | |
|-------------|------------|------------|-------------|-------------|-------------|------|
| aagaagcacc | ggctaactac | gtgccagcag | ccgcggtaat | acgtaggggtg | caagcggttaa | 540 |
| tcggaattac | tgggcgtaaa | gggtgcgcag | gcggctttgt | aagtcagatg | tgaaatcccc | 600 |
| gggcttaacc | tgggaattgc | gtttgaaact | acaaagctag | agtgtagcag | aggggggtgg | 660 |
| aattccatgt | gtagcagtga | aatgcgtaga | gatatggaag | aacatcgatg | gcgaaggcag | 720 |
| ccccctgggt | taacactgac | gctcatgcac | gaaagcggtg | ggagcaaaca | ggattagata | 780 |
| ccctggtagt | ccacgcccta | aacgatgtca | actagttgtt | gggccttact | aggcttggtg | 840 |
| acgtagctaa | cgcgtagaag | tgaccgcctg | gggagtagcg | tcgcaagatt | aaaactcaaa | 900 |
| ggaattgacg | gggacccgca | caagcggtgg | attatgtgga | ttaattcgat | gcaacgcgaa | 960 |
| aaaccttacc | tacccttgac | atgtagcgaa | tatttttagag | ataaaatagt | gccttcggga | 1020 |
| acgctaacac | aggtgctgca | tggctgtcgt | cagctcgtgt | cgtagagatgt | tgggttaagt | 1080 |
| cccgcacga | gcgcaaccct | tgtcattaat | tgccatcatt | tagttgggca | ctttaatgag | 1140 |
| actgccggtg | acaaaccgga | ggaagggtgg | gatgacgtca | agtcctcatg | gcccttatgg | 1200 |
| gtagggtctt | acacgtaata | caatggcgcg | tacagagggt | tgccaacccg | cgagggggag | 1260 |
| ctaattctcag | aaagcgcgtc | gtagtccgga | tcggagtctg | caactcgact | ccgtgaagtc | 1320 |
| ggaatcgcta | gtaatcgcg | atcagcatgt | cgcggtgaat | acgttcccgg | gtcttgtaga | 1380 |
| caccgcccgt | cacaccatgg | gagtgggttt | caccagaagc | agatagtcta | accgtaagga | 1440 |
| gggcgtttgc | cacggtgaga | ttcatgactg | gggtgaagtc | gtaacaattt | a | 1491 |

<210> 21
 <211> 18
 <212> DNA
 <213> Artificial

<220>
 <223> Oligonucleotide Probe

| | |
|-----------|----------|
| <400> 21 | |
| tccccactt | ctggacac |
| | 18 |

<210> 22
 <211> 21
 <212> DNA
 <213> Artificial

<220>
 <223> PCR Primer

| | |
|------------|--------------|
| <400> 22 | |
| gtgactaata | atcacaactt a |
| | 21 |

<210> 23
 <211> 20
 <212> DNA

<213> Artificial

<220>

<223> PCR Primer

<400> 23

ttatctctaa aatattcgct

20